

What is claimed is:

1. An active tube, wherein it comprises:  
a working channel tube the inside of which is used as a working channel;  
an SMA coil arranged along said working channel tube;  
one or more weights attached on the outer surface of the combined working channel tube and SMA coil; and  
an outer skin tube covering the outer surface of said weight including said working channel tube and said SMA coil.
2. An active tube, wherein it comprises a tip and a main tube connected to said tip, and said tip is comprises:  
a working channel tube connected through to said main tube;  
a bending mechanism to support said working channel tube and to bend said working channel tube;  
one or more weights attached on the outer surface of said bending mechanism; and  
an outer skin tube covering the outer surface of said bending mechanism together with said weight, wherein  
said bending mechanism includes an SMA coil arranged in the longitudinal direction of said working channel tube.
3. The active tube as set forth in Claim 2, wherein, on the front end side of said main tube, a cylindrical thin film covers inflatable the outer surface of said main tube, and  
said main tube is provided with a balloon inflating channel along the axis of said main tube to supply gas or liquid into the space between said main tube and said thin film, thereby said thin film is inflated to form a balloon.
4. The active tube as set forth in Claim 2, wherein an endoscope is inserted into said working channel tube of said tip.
5. The active tube as set forth in Claim 2, wherein said

endoscope is built in said tip.

6. An active tube, wherein it comprises a tip and a main tube connected to said tip, and it is provided with an endoscope; and said tip is provided with:

a working channel tube connected through to said main tube;

a bending mechanism to support said working channel tube and to bend said working channel tube; and

an outer skin tube covering the outer surface of said bending mechanism,

said bending mechanism is provided with an SMA coil arranged in the longitudinal direction of said working channel tube, wherein a cylindrical thin film covers inflatable the outer surface of said main tube at the tip of said main tube, and

said main tube is provided with a balloon inflating channel along the axis of said main tube to supply air or liquid into the space between said main tube and said thin film, thereby said thin film is inflated to form a balloon.

7. The active tube as set forth in any one of Claims 4 – 6, wherein the front end of said endoscope is provided with an image input part comprising an optical fiber or an image pickup device and a light guide for illumination or LED to illuminate the forward of said image input part.

8. The active tube as set forth in Claim 2 or Claim 6, wherein:

said bending mechanism is provided with a pair of links attached at an interval to said working channel tube; and

an outer skin contacted to said pair of links and covering said working channel tube; and

an air layer is formed with said pair of links and the outer surface of said working channel tube, and

said SMA coil is inserted through each small diameter hole of said pair of links to be wired to said air layer.

9. The active tube as set forth in Claim 8, wherein said SMA coil is inserted through a first small diameter hole of a behind link and a first small diameter hole of a front link, bent back at the front end of said front link, inserted through a second small diameter hole of said front link and a second small diameter hole of said behind link, and is wired.

10. The active tube as set forth in Claim 8, wherein said SMA coil is inserted through each small diameter hole of the behind link and each small diameter hole of the front link between said pair of links, bent back a plurality of times, and is wired.

11. The active tube as set forth in Claim 8, wherein a plurality of said SMA coils are provided at equal intervals with respect to the central axis of said working channel tube between said pair of links.

12. The active tube as set forth in Claim 2 or Claim 6, wherein; said main tube is provided along the axis of said main tube with a working channel connected through to said working channel tube and a wiring channel to insert the wire to be connected to the SMA coil of said bending mechanism.

13. An active tube system, wherein it comprises an active tube, a control box to control a bending mechanism of said active tube, and a control input part to input the control information for said bending mechanism to said control box; and

    said active tube comprises a tip and a main tube connected to said tip; and

        the tip of said active tube is provided with;  
        a working channel tube connected through to said main tube;  
        a bending mechanism to support said working channel tube and bend said working channel tube;

        one or more weights attached to the outer surface of said bending mechanism; and

        an outer skin tube covering the outer surface of said bending

mechanism together with said weight; and

    said bending mechanism includes an SMA coil arranged in the longitudinal direction of said working channel tube.

14. The active tube system as set forth in Claim 13, wherein, on the front end side of said main tube, a cylindrical thin film covers inflatable the outer surface of said main tube; and

    said main tube is provided with a balloon inflating channel along the axis of said main tube to supply gas or liquid into the space between said main tube and said thin film, thereby said thin film is inflated to form a balloon.

15. The active tube system as set forth in Claim 13, wherein an endoscope is inserted into said working channel tube of said tip.

16. The active tube system as set forth in Claim 13, wherein said endoscope is built in said tip.

17. An active tube system, wherein it comprises an active tube, a control box to control a bending mechanism of said active tube, and a control input part to input the control information for said bending mechanism to said control box;

    said active tube comprises a tip and a main tube connected to said tip; and said active tube is provided with an endoscope;

    said tip is provided with a working channel tube connected through to said main tube, a bending mechanism to support said working channel tube and bend said working channel tube, and an outer skin tube covering the outer surface of said bending mechanism;

    said bending mechanism includes an SMA coil arranged in the longitudinal direction of said working channel tube; and

    on the front end side of said main tube, a cylindrical thin film covers inflatable the outer surface of said main tube; and

    said main tube is provided with a balloon inflating channel along the axis of said main tube to supply air or liquid into the space between said main tube and said thin film, thereby said thin film is

inflated to form a balloon.

18. The active tube system as set forth in any one of Claims 15 – 17, wherein the front end of said endoscope is provided with an image input part comprising an optical fiber or an image pickup device and a light guide or LED for illumination to illuminate the forward of said image input part.

19. The active tube system as set forth in Claim 13 or Claim 17, wherein;

said bending mechanism is provided with a pair of links attached at an interval to said working channel tube; and

an outer skin contacted to said pair of links and covering said working channel tube; and

an air layer is formed with said pair of links and the outer surface of said working channel tube; and

said SMA coil is inserted through each small diameter hole of said pair of links to be wired to said air layer.

20. The active tube system as set forth in Claim 19, wherein said SMA coil is inserted through a first small diameter hole of a behind link and a first small diameter hole of a front link, bent back at the front end of said front link, inserted through a second small diameter hole of said front link and a second small diameter hole of said behind link, and is wired.

21. The active tube system as set forth in Claim 19, wherein said SMA coil is inserted through each small diameter hole of the behind link and each small diameter hole of the front link between said pair of links, bent back a plurality of times, and is wired.

22. The active tube system as set forth in Claim 19, wherein a plurality of said SMA coils are provided at equal intervals with respect to the central axis of said working channel tube between said pair of links.

23. The active tube system as set forth in Claim 13 or Claim 17, wherein;

said main tube is provided along the axis of said main tube with;

a working channel connected through to said working channel tube; and

a wiring channel to insert the wire to be connected to the SMA coil of said bending mechanism.

24. The active tube system as set forth in Claim 13 or Claim 17, wherein; said control input part has a control stick with a formed grip and said control stick is provided with a slide type operational mechanism which can be grabbed with a palm.